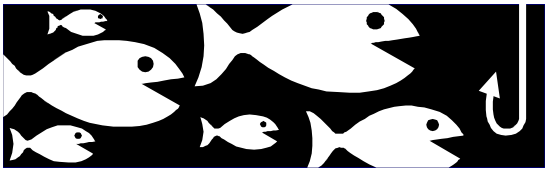
SC1

POLLUTION OF AQUATIC LIFE



CATALINA SCHOUTEN 11N
MR BENDALL

AIM:

In this investigation I will be investigating the effect pollution has on aquatic life. In this case I will be using a Daphnia (water flea).
I am planning to do this by placing the Daphnia in a petri dish with pond water and I will be adding the pollutant Caffeine. Then I will be measuring its heart rate.

Background Information

Humans affect the water because of various reasons. One reason is because of untreated sewage in the water. Micro-organisms that break down the sewage use up a lot of oxygen in the water.
Pesticides also pollute the water. They are mainly used on farms, so therefor lakes and ponds near farms get polluted regularly. This is because when it rains, the chemicals dissolve and seep into the soil. The chemicals then get into the lakes or rivers.
Pollutants also use up oxygen in the water. Therefore living organisms die because of the lack of oxygen.
The pollutant that we are using in this experiment is caffeine. Caffeine is found in tea, coffee and kola nut. It stimulates the heart and the central nervous system. When isolated it is a bitter crystalline compound. Too much intake of caffeine can be detrimental to health.

Picture of a daphnia. The arrow is pointing to the heart.

Dependent Variables

In this investigation, I will be measuring the heart rate of the water flea. I will do this by placing the water flea under a microscope and count its heartbeat. I will be able to do this because the water flea is translucent and I will be able to see its heart beating. I will do it for fifteen seconds, then multiply the result by four to get a minute worth.

Independent Variables

In this investigation, we will be changing the amount of caffeine we are adding into the petri dish with the pond water. We will be doing this to see if it has any effect.

Controlled Variables

To make this experiment fair, we will be keeping certain things the same. They are:

- **The amount of caffeine we will be putting into the water after each minute.**
- **The amount of pond water in the petri dish.**
- **The same temperature; if the temperature goes up the Daphnia might begin to cook.**

Prediction

I predict that the higher the concentration of caffeine gets the faster the heart rate of the Daphnia gets.
My reason for this is because pollution in water uses up all the oxygen in the water. Therefore the heart rate of the Daphnia won't get as much oxygen as it need and it will beat faster.

Method

1. **First of all, we will catch a Daphnia. We will put the daphnia into a petri dish with some pond water and Vaseline. The daphnia's bottom will be placed into the Vaseline. This is because it will prevent the daphnia from swimming away.**
2. **We will take the normal heartbeat of the daphnia without any caffeine. Once the daphnia has calmed down, we will add the pollutant (caffeine) to the petri dish.**
3. **Then we will put a microscope over the daphnia and count its heartbeat. The way we will do is by looking at its heart and counting it for 15 seconds. Then we will multiply the result by 4 to get our minutes worth.**
4. **We will repeat this another two times to get a fair test.**

How to make it a fair test

To make it a fair test, we will keep the controlled variables the same. We will also use the same daphnia to do the testing.

Equipment

- **Pipette**
- **Petri dish**
- **Vaseline**
- **Microscope**
- **Daphnia**
- **Storage tank**
- **Caffeine**
- **Stopwatch**
- **Pond water**

Safety

To ensure that this experiment will go safely, we will be handling the pollutant solution carefully. This means ensuring that the solution is kept away from the side of the worktops to prevent it from falling over and to avoid spillage. It also means that nobody drinks the solution.
We will also ensure that we handle the daphnia carefully. This means ensuring that we don't kill the daphnia by picking it up.

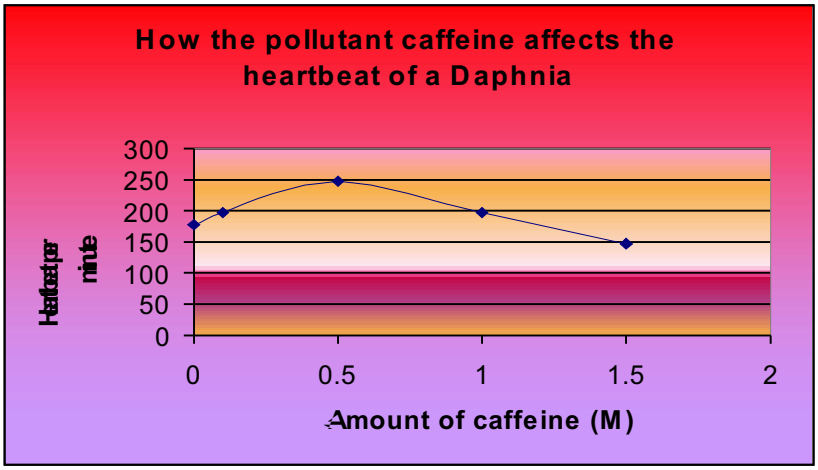
Results

	Heartbeat per minute			Average
Amount of caffeine	**1st Test**	**2nd Test**	**3rd Test**	
No Caffeine	**178**	**189**	**193**	**560**
0.1M	**198**	**204**	**209**	**611**
0.5M	**248**	**278**	**284**	**810**
1.0M	**197**	**257**	**261**	**715**

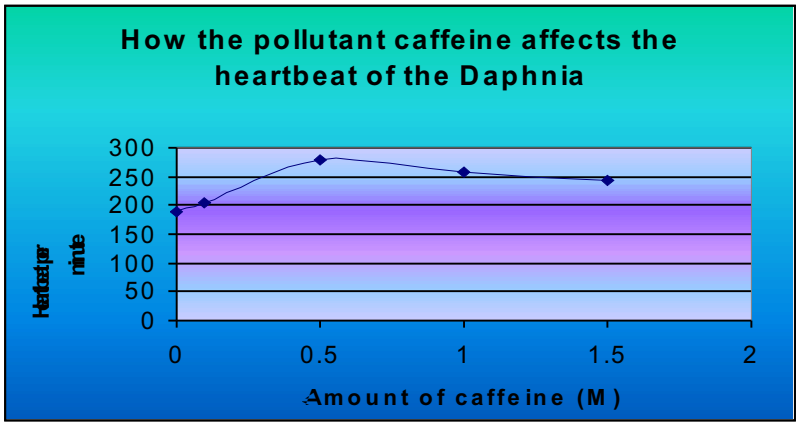
1.5M	**148**	**243**	**258**	**649**

Graphs showing the 3 sets of results.

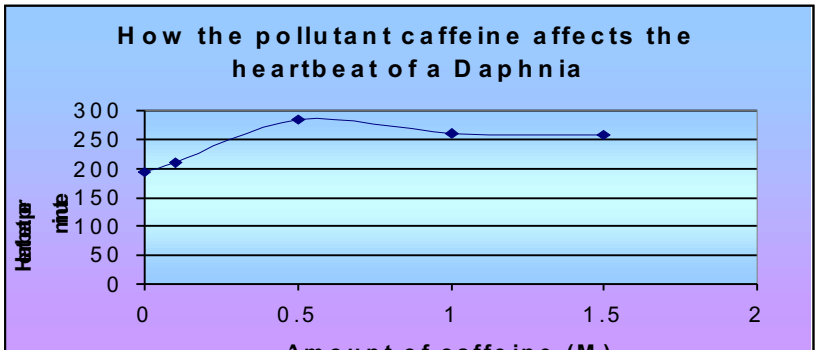
1st Test



2nd Test



3rd Test



What the graphs show

The graphs show me that as the amount of the caffeine increased, the heartbeat went up quite fast. When it reached its peak point, its heartbeat went down, and I came to the conclusion that the daphnia might have got distressed and its body slowed down.
The graphs showed different results because we used different daphnias, and some of the daphnias were stronger than others, which might have made the investigation unfair.

Evaluation

I think that the experiment was a success and everything had gone to plan. The results recorded are reliable and accurate.
However, we did change some of our plan. Instead of counting the daphnia's heartbeat for 15 seconds and then multiplying by four to get a minute worth, we counted for a full minute. We did this because we felt that if we only counted for fifteen seconds, it would not be a fair test. This is because the heartbeat could have increased, or decreased for the other 45 seconds. We also changed the daphnias we were using for every experiment. This was because the first one we used, it died. So we decide to use different daphnias for every experiment to make it fair.
The experiment was done safely and accurately. Care was used to make sure that there were no spillages, but there wasn't anything we could have done to stop the daphnia from dying.